

Washington State Department of HEALTH

WASHINGTON TREATMENT LANDSCAPE

Jolyn Leslie, PE

Office of Drinking Water – Wa DOH

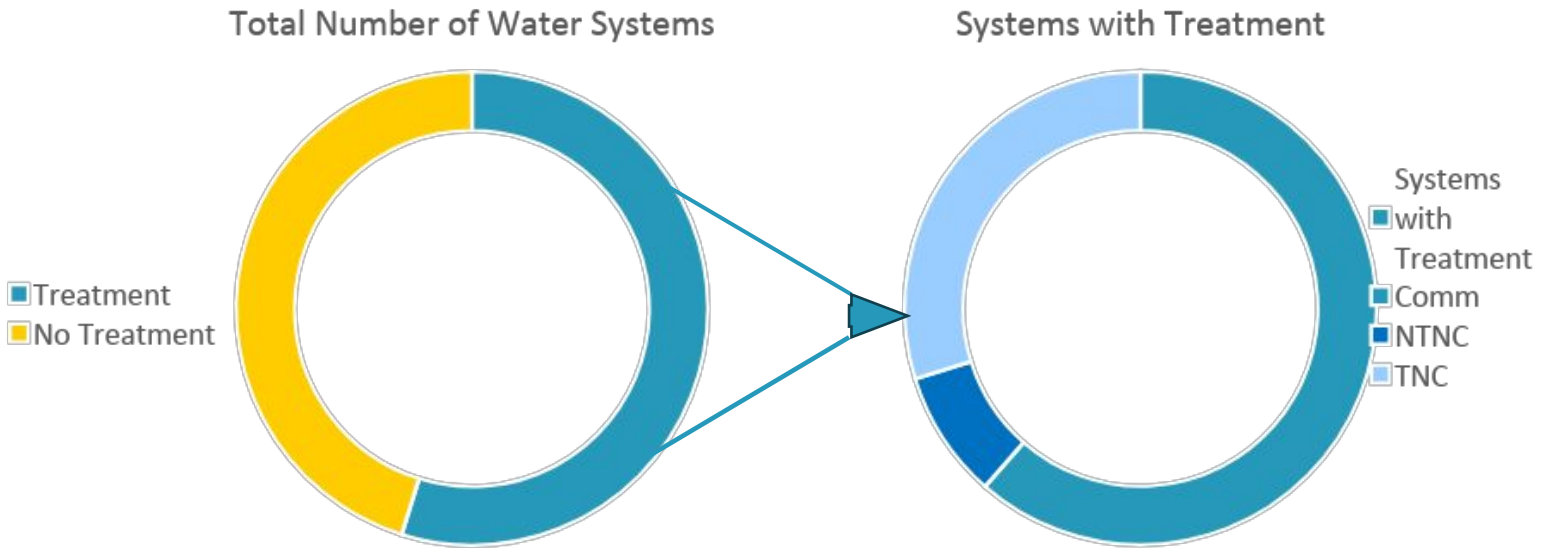
Presentation Outline

- Treatment Overview
- Surface Water Treatment
- Primary Contaminants
- DBP Control/Removal
- Corrosion Control
- Secondary Contaminants
- The Next Big Thing
- Operational Oversight
- Certified Operators
- Resources

Treatment Overview

- Treatment techniques (SWTR, GWR)
- Remove something (primary/secondary contaminants)
- Change water quality (corrosion control)
- Preventative (disinfection)

The Big Picture



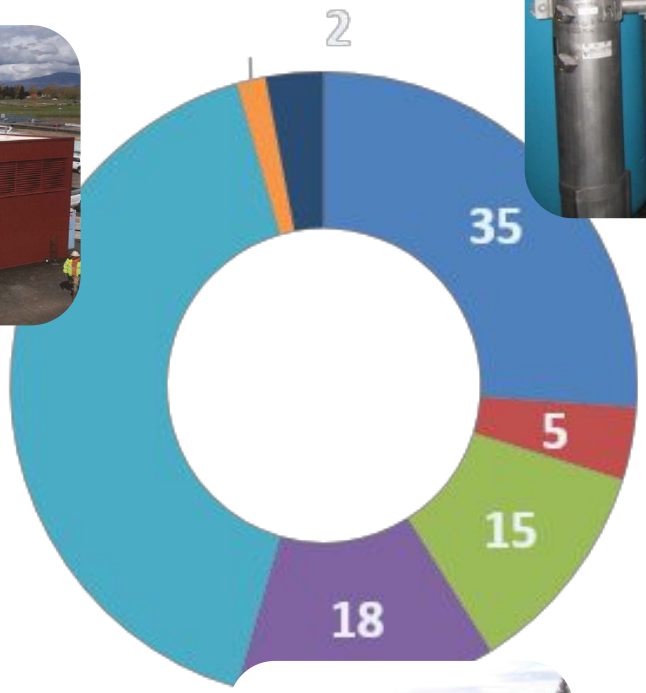
Surface Water Treatment

- Suite of SWTR Rules
- Filtration*
- Disinfection (primary)
- Distribution residual (secondary)
  - Minimum detectible residual = 0.2 mg/L

Surface Water Treatment







Bag/Cartridge
Diatomaceous Earth
Membrane
Slow Sand
Rapid Rate
Bank Filtration
Unfiltered

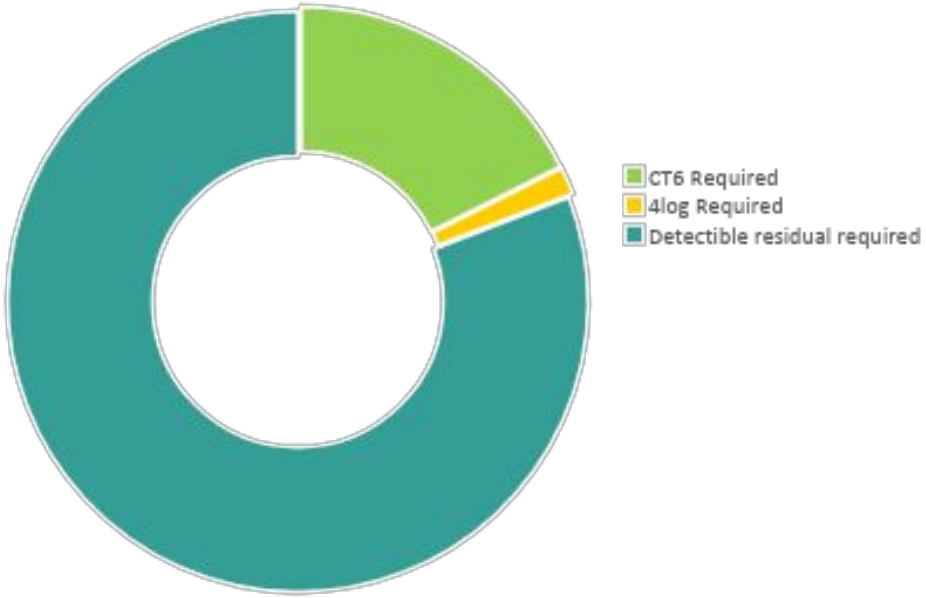


Surface Water Disinfection

- Primary Disinfection
  - Free chlorine
  - Chlorine Dioxide
  - Ozone
  - UV
- Secondary Disinfection
  - Free chlorine
  - Chloramines

Groundwater Disinfection

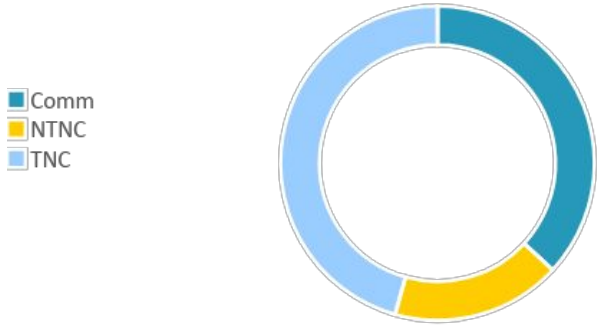
- Washington State – CT6 (WAC 246-290-451)
- Groundwater Rule (GWR) – 4-log Required (WAC 246-290-453 & 40 CFR 141.400-405)
- Distribution residual
  - Minimum detectible residual = 0.2 mg/L



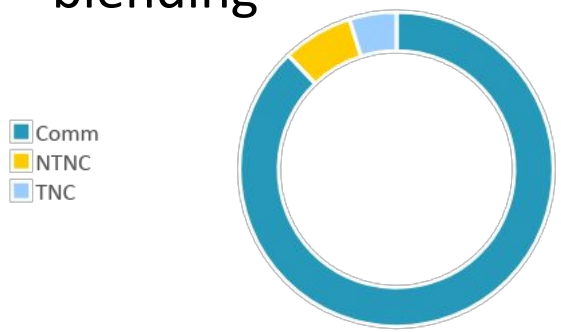
Primarily free chlorine, but…

Primary Contaminants

- Nitrate treatment – 118 sources
  - Ion exchange, RO, blending



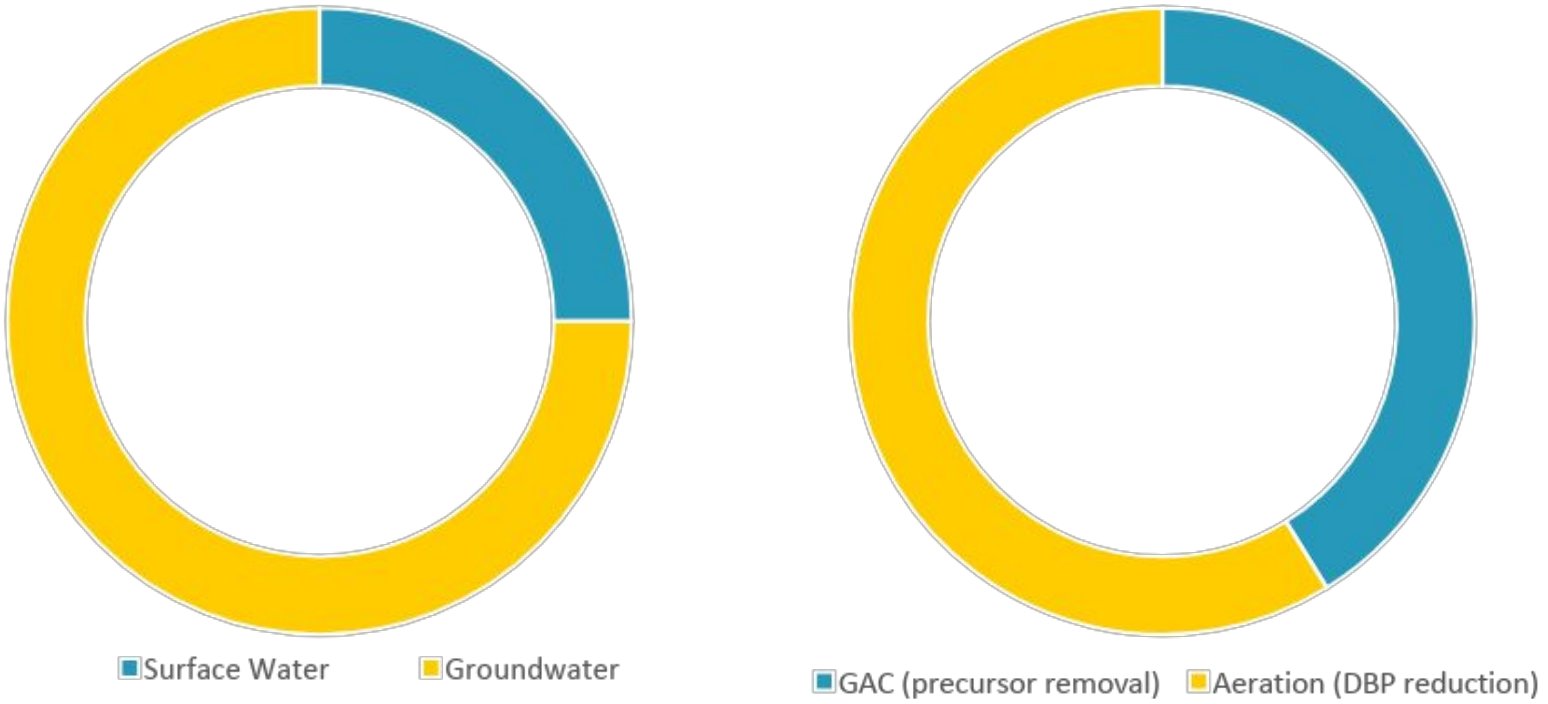
- Arsenic treatment – 124 sources
  - Adsorbents, coagulation/filtration, blending





Disinfection Byproducts

- 16 water systems have specific treatment for DBP control



Corrosion Control

- Corrosion control – 291 water systems
  - Caustic soda
  - Soda Ash
  - Aeration
  - Lime
  - Calcite
  - Orthophosphate

Secondary Contaminants

- Iron and manganese – 334 treatment plants
- Oxidation filtration
  - Oxidants include chlorine, ozone, and potassium permanganate
  - Filtration includes greensand, manganese dioxide, sand media
  - Some plants paired with arsenic removal
- Ion exchange
- Oxidation/in-tank settling
- Sequestration
  - Recommend limit for combined Fe/Mn level not to exceed 0.5 mg/L
  - Combined Fe/Mn level >1.0 mg/L (with Mn >0.1 mg/l) we will not approve

DOH Manganese Initiative

- Manganese now known to impact health, particularly infants and children
- New public health messaging
  - EPA health advisory levels – 0.3 mg/L and 1.0 mg/L
  - New state recommendation 0.05 mg/L
- Resources
  - DOH #331-741
  - Systems with treatment, goal to achieve 0.02 mg/L

PFAS – Evolving Health Standards

EPA Health Advisories 2016		Washington SALs 2021		EPA Health Advisories 2022		EPA MCLs 2024—Now Adopted into WA State Rules	
PFOA	70	PFOA	10	PFOA	4	PFOA	4
PFOS	70	PFOS	15	PFOS	20	PFOS	4
		PFNA	9	PFBS	2,000	PFHxS	10
		PFHxS	65	GEN X	10	PFNA	10
		PFBS	345			HFPO-DA (GEN X)	10
70 ppt individually or combined.		*Non-cancer endpoints sufficiently protective of cancer endpoint.*				*Hazard Index for GenX, PFHxS, PFNA, and PFBS less than 1.*	

All values ng/L or ppt

Impact of Federal* and State PFAS Standards

- Results so far:

Measure	# of Water Systems	# of Sources
Total Group A Comm and NTNCs	2417	3971
Collected at least 1 PFAS sample	2213	3578
Had at least one detection of any PFAS analyte	401	611
Exceeds the SAL / MCL for any PFAS analyte	163	168

PFAS Treatment

- Currently, treatment installed at four systems, all GAC
- Several more projects in preliminary/design/construction phase
  - GAC
  - Blending
  - Granular clay adsorbent media

Operational Oversight

- Treatment plants require water treatment plant operators
- Operators are a key part of the multiple barrier approach to protecting public health
- Need to know that the treatment is working as intended

Performance and Operations Monitoring

- Required monthly operations reports (MORs)
  - Water system should monitor all treatment processes
  - SWTR
  - Primary contaminants – arsenic, nitrate
  - Groundwater disinfection – GWR, CT6, required distribution residual
- Operations monitoring
  - Important to ensure that treatment always functions safely and reliably, even when unattended
  - Field monitoring paired with lab duplicates
  - Not necessarily a part of MOR
  - Intended to help operator/trouble-shoot

Operator Certification

- Washington State – Associated Boards of Certification (ABC)
- WAC 246-292 Waterworks Operator Certification
  - Distribution (WDM) – based on population
  - Treatment (WTPO) – based on type of treatment
- Treatment plant rating form
- Treatment plant operator not required for addition of chemicals only

WASHINGTON STATE DEPARTMENT OF HEALTH

PURIFICATION PLANT CRITERIA WORKSHEET **ABC Classification: WTPO**

Water Treatment Plant - address and contact person	**System Name**	
Plant Name/Source #s		WA WFI #
Contact Name and Title		
Address		
City/State/Zip		
Phone and Fax		

A groundwater supply with only chlorination is considered a distribution system, not a water treatment facility. The addition of any chemical to a public water supply, other than a disinfectant, will be considered a treatment facility and should use this rating worksheet to determine the classification of the facility.* Unless otherwise noted, give full amount of points in the "Your Plant" box.
For example:

	Raw water quality is subject to or has elevated:	Points	Your Plant
Correct:	Taste and/or odor levels	3	3
Incorrect:	Taste and/or odor levels	3	1

Do not double count. If the plant has two horizontal-flow (rectangular basins), **DO NOT** give 10 points, give 5 points. If the plant has more than one type of unit for each process, give points once for each unit.

*With the exception of unit processes installed to allow in-line fluoridation, in-line chlorination, or chemical addition to inhibit corrosion are not included within the scope of the term "water treatment plant" per WAC 246-292-040(c).

Item	**Points Possible**	**Your Facility**
Size		
Design flow average day, or peak month s average day, whichever is larger (1 point per 0.5 MGD. Round up.) Design flow: Consider this to be the design capacity of the plant. Examples: 9.2 MGD = 19 points, 4.7 MGD = 10 points (20 points maximum allowed)	1 – 20	
Water Supply Sources (Rating based on public health significance)		
Seawater/saltwater	0	
Groundwater	0	
Groundwater under direct influence of surface water (GWI)	8	
Surface water	10	
Average Raw Water Quality Variation - Applies to all sources (surface and groundwater). Key is the effect on treatment process changes that would be necessary to achieve optimized performance. • Little or no variation - no treatment provided except disinfection (0 points) • Minor variation - e.g. "high quality" surface source appropriate for slow sand filtration (1 point) • Moderate variation in chemical feed, dosage changes made: monthly (2 points), weekly (3 points), or daily (4 points) • Variation significant enough to require pronounced and/or very frequent changes (5 points) • Severe variation - source subject to non-point discharges, agricultural/urban storm runoff, flooding (7 points) • Raw water quality subject to agricultural or municipal waste point source discharges (8 points) • Raw water quality subject to industrial waste pollution (10 points)	0 – 10	
Raw water quality is subject to:		
• Taste and/or odor for which treatment process adjustments are routinely made	2	
• Color > 15 CU (not due to precipitated metals) - see exceptions in Note 1 at end of table.	3	
• Iron or/and manganese > MCL: Fe (2 points), Mn (3 points) (3 points maximum allowed) see exceptions in Note 1 at end of Table 1	2 – 3	
• Algal growths for which treatment process adjustments are routinely made	3	

Useful Resources

- Monitoring Water Treatment Processes, DOH #331-620
- Preventive Maintenance Program, Guide for Small Public Water Systems Using Groundwater, DOH #331-351



Questions?

Acknowledgements:

Jeff Johnson, PE, LHG, WaDOH

Jolyn Leslie, PE

Surface Water Program Manager

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